MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

Permitting and Compliance Division
Water Protection Bureau
P.O. Box 200901
Helena, MT 59620-0901

Permit Fact Sheet
Montana Ground Water Pollution Control System (MGWPCS)

Permittee:	Avalon Living Inc. P.O Box 144 Emigrant, MT 59027
Permit No.:	MTX000118
Receiving Water:	Class I Ground Water
Facility Information	
Name:	Avalon Assisted Living Facility
Mailing Address:	P.O Box 144 Emigrant, MT 59027
Contact:	E. Margaret Keathley
Phone:	406-333-4718
Fee Information	
Number of Outfalls:	1
Outfall - Type:	001a - Subsurface Drainfield 001b - Subsurface Drainfield

---

I. Permit Status

This is a renewal permit for an existing wastewater treatment system that is part of an assisted living facility located in Emigrant, MT near the Yellowstone River. In 2001 this facility was issued a Montana Ground Water Pollution Control System (MGWPCS) permit. The 2001 permit authorized discharge of residential strength wastewater from the Avalon Assisted Living Facility (AALF) to ground water.

The Department received the renewal application and supporting documents on March 6, 2006. The application was determined to be deficient March 15, 2006. The Department received a response to the deficiency letter and a complete permit application was received on April 24, 2006. The permit application was deemed complete on May 1, 2006

II. Facility Information

A. Facility Description

The AALF is currently discharging an average volume of 290 gallons per day of wastewater from one, four unit condominium. The permit application submitted by Stahly Engineering and Associates (SEA) indicated additional units to be connected to the wastewater treatment system. A total of 16 condominium units, one assisted living building and one professional building will be connected to the wastewater treatment system. The condominium units will employ a total of four (4) 2,500 gallon septic tanks and two (2) 1,000 gallon pump tanks. The Assisted living facility will employ four (4) 3,000 gallon septic tanks and two (2) 1,000 gallon pump tanks. The professional building will employ one (1) 1,600 gallon capacity septic tank and one (1) 800 gallon pump tank.

Effluent from each building will be conveyed via a two (2) inch force mains to a 15,000 gallon capacity recirculating tank. Effluent will then be pumped to a two (2) zoned recirculating sand filter, each with 16 laterals. Under flow from the recirculating sand filter will be collected via four (4) inch PVC drain pipes and conveyed either back to the recirculation tank or to one (1) of two (2) 2,500 gallon capacity dose tanks. The effluent will then be pumped to a two (2) zoned subsurface drainfield, which will then discharge to ground water.

The discharge points from the dose tank are the Zone 1 and Zone 2 drainfields. The Zone 1 and Zone 2 drainfields will discharge effluent from the same does tank, however both drainfields are plumed to separate areas. Therefore the drainfields will be identified as Outfall 001a (Zone 1) and 001b (Zone 2). The bottom of the drainfields (outfalls 001a and 001b) are located approximately 1.0’- 1.5’ below the ground surface. Outfalls 001a and 001b are situated in T5S, R8E, Section 28, southeast quarter and Section 33 northeast quarter or 45° 21’51” N latitude and 110° 44’24” W longitude. The wastewater treatment system will have the capacity to discharge a daily maximum of 6,005 gpd (design capacity) to the groundwater. Each drainfield will receive half of the discharge from the does tank. The drainfields are located on the hydraulically upgradient side of the AALF (Attachment 1).

B. Effluent Characteristics

The wastewater treatment system is an existing system therefore some effluent samples have been collected and analyzed as part of permit conditions. Effluent samples have been collected and analyzed for Total Nitrogen, Total Inorganic Nitrogen, Total Suspended Solids and Ammonia. Average values for these parameters are 38.4 mg/L, 36.3 mg/L, 13.0 mg/L and 14.75 mg/L respectively. The Total Inorganic Nitrogen limit of 26 mg/L has been exceeded numerous times since 2004. The second quarter 2006 monitoring events yielded a Total Nitrogen concentration of 17.5 mg/L. Third quarter of 2006 sampling and analysis yielded Total Nitrogen values of 18.9 mg/L. As mentioned earlier, AALF is discharging an average volume of 290 gallons per day of wastewater. The existing system was designed to operate at the design capacity (6,005 gallons per day). It is expected that once the wastewater treatment system is receiving the volume of wastewater it was designed to operate with, the system will function

properly. This in conjunction with the recent decreases in Total Nitrogen (2^{nd} and 3^{rd} quarters of 2006)strongly increases the probability that AALF will meet its permitted limit.

Not all parameters of concern were analyzed as part of permit requirements. Additional information regarding typical effluent characteristics is listed below. The effluent that is discharged from a typical recirculating sand filter system to the drainfield is expected to have the following average chemical characteristics:

- Total Nitrogen (sum of nitrate, nitrite and ammonia and organic nitrogen as N) 10-50 mg/L (EPA, 2002)
- Total Phosphorus: 10.6 mg/L (DEQ, 1997)
- Biological Oxygen Demand (BOD): 2-15 mg/L (EPA, 2002)
- Total Suspended Solids (TSS): 5-20 mg/L (EPA, 2002)
- Bacteria (Escherichia Coli): $10^1 – 10^3$ organisms (EPA, 2002)

III. Proposed Technology Based Effluent Limits

A recirculating sand filter meets the definition of level II treatment (Regensburger 2004, see attachment II). A level II wastewater treatment system must provide at least a 60 percent removal of total nitrogen in the raw wastewater or produce effluent with a total nitrogen concentration of 24 mg/L or less [ARM 17.30.702 (11)]. The Department will use 24 mg/l as an effluent limit because of the uncertainties involved with calculating 60 percent removal of total nitrogen in a wastewater treatment system incorporating multiple septic tanks. Because an additional 7% of nitrogen removal is assumed to occur within the drainfield a proposed limit of 26 mg/L will be used.

The proposed technology based effluent limits for outfall 001a and 001b are presented in Table 1.

Table 1. Technology Based Effluent Limit for Outfall 001a and 001b

Parameter	Concentration (mg/L) Daily Maximum (1)
Total Nitrogen as N	26

(1) See definitions, Part I.A of the permit

IV. Water-Quality Based Effluent Limits

A. Receiving Water

The permittee submitted ground water analytical data from wells around the existing assisted living facility. All well data used in development of permit conditions comes from wells that are all located within one mile of the discharge site.

One ground water quality sample was collected up gradient of the proposed discharge site. This well was sampled most recently on March 22, 2006. This sampling event yielded a nitrate plus nitrite (as N) concentration of 1.21 mg/L and conductivity of 248 µmhos/cm. Additional ground water quality sampling was conducted from a well located down gradient of the proposed discharge on the Avalon living facility property. The reported nitrate plus nitrite (as N)

concentration of this well on March 22, 2006 was 1.20 mg/L and conductivity was 248 µmhos/cm.

The receiving water for Outfall 001a and 001b is Class I groundwater as defined by ARM 17.30.1006 (1)(a). The quality of Class I groundwater must be maintained so that these waters are suitable for public and private water supplies, culinary and food processing, irrigation, commercial and industrial purposes, drinking water for livestock and wildlife. Human health standards listed in DEQ-7 (February 2006) apply to concentrations of dissolved substances in Class I ground waters with a specific conductance of less than 1,000 µmhos/cm [RM 17.30.1006(1)(a)(i)]

The average hydraulic conductivity of the aquifer is 243 ft/day. This estimate is derived from aquifer tests (Slug tests) performed on three onsite wells. Hydraulic conductivity values for all three wells were determined via the Bouwer/Rice model and aquifer characteristic data collected during the aquifer test. These values were reported to the Department as part of the ground water investigation conducted in June 1999 for the Non-degradation Analysis Report (submitted with the 1999 permit application). The hydraulic gradient in the shallow ground water is 0.018 ft/ft, estimated from monitoring well AV-1, AV-6 and the elevation of several seeps to the southeast of the existing discharge. Hydraulic gradient was established during the 1999 ground water investigation. An on-site investigation conducted by Jeffery McNabb, PE in 1995 revealed that the water table is an unconfined, sandy/gravelly aquifer that is perched on a clay layer at approximately 12-15 feet from the ground surface. A portion of this study revealed the shallowest ground water levels in the immediate area of the wastewater treatment system range from approximately 9-10 feet below the surface.

Soil profiles logged on May 5, 1999 indicate soils ranging from sand to sandy gravel with cobbles. The soil profiles were conducted from ground level to approximately 8-feet below the surface. These finding agree with the National Resources Conservation Service (NRCS) descriptions of soil types expected to be found on site. The NRCS indicates that Cobbly sandy loam occurs in the first 0-8 inches, extremely gravelly loam, course sand and extremely gravelly sand occur in the 8-60 inch depth, and that these are the dominant soil types for this site (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx).

Based on proximity, the nearest surface water is a small pond (approximately 6 acres in surface area) east of the existing discharge location and across gradient. The pond borders the AALF site and is approximately 450 feet from the drainfields. Based on the direction of ground water flow, the nearest surface water to Outfalls 001a and 001b is the Park Branch Canal approximately 1,650 feet downgradient. Immediately adjacent to the canal and further down gradient (to the east) is the Yellowstone River. The ground water flow direction in the vicinity of the drainfield is approximately S70°E based on the 1999 ground water investigation.

B. Basis for Water Quality based Effluent Limits

ARM 17.30.506 (1) states that a discharge to State water shall not cause a violation of a water quality standard outside a Department authorized mixing zone. Ground water quality standards apply at the down-gradient mixing zone boundary in the unconfined aquifer.

Water quality limitations must be established in permits to control all pollutant or pollutant parameters that are or may be discharged at a level which will cause, have reasonable potential to cause or contribute to an excursion above any state water quality standard. The permittee must comply with the permit developed by the Department in accordance with the Montana Numeric Water Quality Standards included in Circular DEQ-7 (February 2006) and protection of beneficial uses (ARM 17.30.1006). Ground water quality standards may be exceeded within a Department authorized mixing zone (ARM 17.30.1005), provided that all existing and future beneficial uses of state waters are protected [ARM 17.30.506 (1)].

C. Nitrate

Class I ground water is considered high quality water and is subject to Montana's Nondegradation Policy 17.30 subchapter 7. The wastewater system is considered a existing source as pursuant to ARM 17.30.702 (18)(a). The applicable ground water standard, a nitrate concentration of 7.5 mg/L at the end of the proposed standard mixing zone is based on nondegradation rules [ARM 17.30.715 (1)(d)(iii)].

Total nitrogen is the sum of inorganic nitrogen and organic nitrogen concentration (nitrate + nitrite as N (NO_3+NO_2-N) plus ammonia and organic nitrogen as N). The Department assumes all the nitrogen discharged to the drainfield in the effluent is converted to nitrate as nitrogen. The allowable discharge concentration is derived from the mass balance water quality equation, which considers dilution and background concentration of the receiving water (EPA, 2000).

$$C_2 = \frac{C_3 (Q_1 + Q_2) - C_1 Q_1}{Q_2}$$

C_1= ambient ground water (background) concentration, mg/L
C_2 = allowable discharge concentration, mg/*L*
C_3 = ground water concentration limit for pollutant (from Circular DEQ-7 February 2006 or other appropriate water quality standard) at the end of the mixing zone.
Q_1 = ground water volume (ft^3 / day)
Q_2 = maximum flow of discharge (design capacity of system in ft^3 / day)

The volume of ground water that will mix with the discharge (Q_s) is estimated using Darcy's equation: $Q_1 = K\ I\ A$.

Where: Q_1 = ground water flow volume (ft^3/day)
K = hydraulic conductivity (ft/day)
I = hydraulic gradient (ft/ft)
A = cross-sectional area (ft^2) of flow at the down-gradient boundary of a standard 500-foot mixing zone.

$(Q_{1\text{-}001}) = (243\ ft/day)(0.018\ ft/ft)(2580 ft^2)$
$Q_{1\text{-}001} = 11285\ ft^3/day$

The design capacity of the entire wastewater disposal system is 6,005 gpd, or 803 ft^3/day. Hydraulic conductivity (K) of the alluvium is estimated at 243 feet per day (ft/d). The gradient was calculated based on well data from wells surrounding the site, at 0.018ft/ft. The area (A) is calculated by the width of the source perpendicular to the ground water flow direction, times a standard mixing zone depth in the groundwater of 15 feet. The applicable water quality standard of 7.5 mg/L must be met at the end of the mixing zone. Nitrate concentrations in the upgradient well sampled on March 22, 2006 yielded a nitrate + nitrite concentration of 1.20 mg/L. Therefore an ambient concentration of nitrate (as N) of 1.20 mg/L was used in calculating the allowable nitrogen concentration. It is assumed that the entire total nitrogen load in the seepage effluent converts to nitrate and enters the ground water.

$$C_{2\text{-}001a} = \frac{7.5 \text{ mg/L } (11285 \text{ ft}^3\text{/day} + 803 \text{ ft}^3\text{/day}) - (1.20 \text{ mg/L}) (11285 \text{ ft}^3\text{/day})}{(803 \text{ ft}^3\text{/day})}$$

$$= 96.0 \text{ mg/L}$$

$$C_{2\text{-}001b} = \frac{7.5 \text{ mg/L } (11285 \text{ ft}^3\text{/day} + 803 \text{ ft}^3\text{/day}) - (1.20 \text{ mg/L}) (11285 \text{ ft}^3\text{/day})}{(803 \text{ ft}^3\text{/day})}$$

$$= 96.0 \text{ mg/L}$$

The projected daily maximum concentration of the total nitrogen in the effluent discharged to groundwater must not exceed 96.0 mg/L at Outfalls 001a and 001b. These effluent limits ensure the nitrate plus nitrite (as N) concentration at the end of the ground water mixing zones are at or below the nondegradation significance criterion of 7.5 mg/L.

D. Phosphorus

Phosphorus is removed mainly through soil adsorption processes, which vary based on soil composition. The 50-year breakthrough nondegradation criterion is based on the amount of soil available to adsorb the phosphorus between the discharge point, the closest surface water and the average load of phosphorus from the wastewater source. The total phosphorus limitations are imposed to ensure that the quality of the effluent meets the nondegradation limit prior to discharge into any surface water [ARM 17.30.715(1)(e)]. The effluent limits do not include a concentration limit for phosphorus because of the method used to determine compliance with the 50-year breakthrough criteria. Phosphorous breakthrough analysis calculations are mass based, therefore the effluent limit will be a mass based discharge limit.

The phosphorus concentration of typical residential wastewater ranges from 6.0 mg/L to 12.0 mg/L (EPA 2002). The Department considers 10.6 mg/L an average concentration of typical residential wastewater (DEQ-Taskforce 1997). The estimated load to ground water based on a design capacity of 6,005 gpd and an expected phosphorous concentration in the effluent of 10.6 mg/L is approximately 0.53 lbs per day.

Using the distance to surface water (Park Branch Canal) approximately 1,650 feet southeast of the drainfields the breakthrough time for phosphorus is 98.3 years. This is based on a phosphorus

load of 153.2 lb/year or 0.42 lbs/day. This breakthrough time is considered nonsignificant pursuant to Montana's Nondegradation criteria [ARM 17.30.715(1)(e)].

A phosphorous breakthrough would occur in 50 years (the level of significant degradation) at an effluent concentration of 16.4 mg/l and load of 0.82 lbs/day. Therefore the effluent limit for the Total Phosphorous load discharged to the drainfields shall not exceed 0.82 lbs /day or 301 lbs/year for Outfall 001a and 001b. The water quality based effluent limits for each outfall are presented on Table 3.

E. Escherichia Coli

A wastewater treatment system that is appropriately sited and operating properly should remove most if not all of the pathogenic bacterial indicators within 2 to 3 feet of the drainfields infiltrative surface (USEPA, 2002). An Escherichia Coli (E coli) limit has not been established in this permit due to the following site-specific criteria:

- The drainfield is pressured-dosed, which minimizes saturated conditions and therefore maximizes the die-off rate in natural sediments.
- Estimated concentration of E coli bacteria 10^6-10^8, and SWIS performance for removal of E Coli bacteria is estimated to be about 99 % (EPA 2002).
- The permittee is required to meet the E Coli ground water standard of less the 1 organisms/100 ml wastewater at the end of the mixing zone.
- The wastewater treatment system has not adequately treated wastewater effluent in the past.

The systematic dosing of the drainfield and the soil matrix of the drainfield provide natural disinfection, which will enable the DEQ-7 human health standard of <1 organism/100 ml to be achieved in the groundwater. Pathogen transport research indicates a 3-log decrease in pathogens for every meter of horizontal movement through the vadose zone and a 6-log decrease in pathogen transport for every 20 m in vertical transport through the saturated zone (Woessner, 1998). The proposed system discharges the effluent about 3 m above the ground water; additional treatment will occur prior to reaching the water table. A 3-log removal in the vadose zone indicates less than 1 colony per 100 ml within 3-feet of the discharge. A Mixing Zone will not be granted for pathogens.

The proposed water quality and nondegradation effluent limits for outfall 001a and 001b are presented in Table 3.

Table 3. Water-Quality Effluent and nondegradation Limits Outfalls 001a and 001b

Parameter	Concentration (mg/L) Daily Maximum (1)	90 Day Average Load (2) (lbs/ per day)
Total Nitrogen as N	96.0	NA
Total Phosphorus as P	NA	0.82

(1) See definitions, Part I.A of the permit

(2) load calculation: lb/d = (mg/L) x flow (gpd) x 8.34 x 10^{-6}

F. Mixing Zone

The drainfields discharge to ground water and qualify for a standard mixing zone [ARM 17.30.517 (1)(b)]. The permittee has proposed to discharge all wastewater from Outfall 001a and 001b, and was previously granted a standard 500-foot ground water mixing zone for both drainfields in a S70°E direction. Groundwater flow direction was established via data collected from monitoring wells on-site. The shape of the mixing zone is determined from the drainfield dimensions, ground water table elevation, and groundwater flow direction, information of which was submitted with the permit application. The concentration of pollutants was estimated, based on a mass balance calculation, at the downgradient boundary of the proposed standard mixing zone. The permittee must comply with the ground water mixing zone rules pursuant to ARM 17.30 Subchapter 5. Ground water standards may be exceeded within the mixing zone provided that all existing and future beneficial uses of the state waters are protected (ARM 17.30.1005).

A ground water mixing zone will be granted for the individual parameter of nitrate [ARM 17.30.505(a)]. The concentration of Nitrate (N) must not exceed 7.5 mg/l on the down gradient boundary of the mixing zone [ARM 17.30.715(1)(d)(iii)]. The permittee will be required to comply with the all applicable ground water quality standards [ARM 17.30.508(1)(a)][ARM 17.30.1006(1)(a), DEQ-7] at the down-gradient edge of the mixing zone.

The dimensions of the wastewater treatment system and the drainfields are illustrated in Attachment I.

V. Final Effluent Limits

The proposed final effluent limitations for Outfall 001a and 001b are summarized in Table 4 and are based on the more restrictive of the technology, water quality and nondegradation significance water quality criteria discussed in previous sections. The final proposed effluent limit for nitrogen is technology based, relating to the expected performance of the subsurface wastewater treatment system with proper operation and maintenance.

The effluent limit for phosphorus is a water quality based nondegradation significance criteria. The water quality based effluent load limit considers the assimilative capacity of the soil system to estimate the maximum load of phosphorus discharged to the groundwater without exceeding the 50-year breakthrough. The 30 day average loads limit will provide protection of water qaulity.

The permittee submitted technical information indicating a design capacity of 6,005 gpd. This value is used in determination of phosphorous load limits and for determining the allowable nitrogen concentration at the end of the mixing zone. The flow limit for outfalls 001a and 001b shall not exceed the design capacity of 6,005 gpd.

Table 4. Numeric Effluent Limits for Outfall 001a and 001b

Parameter	Concentration (mg/L) Daily Maximum [1]	90 Day Average Load[2] (lbs/ per day)
Total Nitrogen as N	26	NA
Total Phosphorus as P	NA	0.82[2]

(1) See definitions, Part I.A of the permit
(2) 90 day average load calculation: lb/d = (mg/L) x flow (gpd) x 8.34 x 10^{-6}
NA = Not Applicable

VI. Monitoring Requirements

Effluent monitoring is essential to ensure the effective treatment and consistency of the wastewater discharged from the facility. The effluent limits are established to protect the ground water from a change in water quality that would cause degradation [ARM 17.30.715] or limit a beneficial use [ARM 17.30.1006(1)(a)]. Samples or measurements shall be representative of the volume and nature of the monitored discharge. Water quality monitoring of the effluent shall occur from the dosing tank prior to discharge into the drainfields. The permittee shall monitor the flow of the effluent continuously and report the gallons per day based on the daily maximum.

The measurement method shall be either by flow meter and recorder or a totalizing flow meter; dose counts or pump run-times will not be accepted. Flow measurement equipment must have the ability to report a daily maximum flow. To ensure that the Total phosphorous load is calculated correctly, an accurate maximum daily flow must be measured. Maximum daily flow shall be measured when required sampling is conducted (flow measurement must correspond to sample collection to calculate an accurate load). The effluent flow rate is to be a measured and reported as a maximum daily flow.

The permittee shall monitor the effluent for the constituents in Table 5 at the frequency and with the type of measurement indicated. If no discharge occurs during the entire monitoring period, it shall be stated in a Discharge Monitoring Report that no discharge occurred.

Table 5. Outfall 001a and 001b Parameters Monitored in the Effluent Prior to Discharge to the Drainfield

Parameter	Frequency	Sample Type[1]
Effluent Flow Rate, gpd[2] [3]	Daily[1]	Continuous[1]
Biological Oxygen Demand (BOD_5), mg/L	Quarterly	Composite
Total Kjeldahl Nitrogen (TKN), mg/L	Quarterly	Composite
NO_3+NO_2 as N, mg/L	Quarterly	Composite
Ammonia, as N, mg/L	Quarterly	Composite
Total Phosphorus (as P), mg/L	Quarterly	Composite
Total Suspended Solids (TSS) mg/L	Quarterly	Composite
Total Nitrogen (as N), mg/L	Quarterly	Calculated
Total Nitrogen (as N), lb/d	Quarterly	Calculated
Total Phosphorus (as P), lb/d	Quarterly	Calculated

Oil and Grease, mg/L	Quarterly	Composite

(1) See definitions, Part I.A of the permit
(2) If no discharge occurs during the reporting period, "no discharge" shall be recorded on the DMR report form
(3) Permittee is to report the daily maximum and 90 day average

A. Ground Water Monitoring

Ground water monitoring will be required in this permit due to the following site-specific criteria:

- Past effluent monitoring data shows that the permittee has exceeded permitted limits, Department must know if water quality standards are being exceeded outside of the mixing zone
- The treatment system is a trickling filter, which does not provide significantly enhanced fecal removal as is obtained with disinfection.
- Proximity of the water table to the surface (8 ft -10 ft below the surface).
- The shallow aquifer is a coarse grained alluvial aquifer with a relatively high hydraulic conductivity (243 ft/day).

The permittee is required to monitor the ground water on the downgradient edges of the standard 500-foot mixing zone. Based on a site map submitted by the permittee, one monitoring well shall be located on the downgradient edge (south east side) of the mixing zone. This well shall be identified as MW-1. This well shall serve as compliance monitoring point for the standard groundwater mixing zone. This shall be screened from the top of the high water table to 15 feet below the low water table. The permittee will conduct quarterly monitoring for the parameters listed in Table 6.

Table 6. Monitoring Parameters for Monitoring Wells: MW-1

Parameter	Frequency	Sample Type (1)
Static Water Level (SWL) (feet below the casing top)	Quarterly	Instantaneous
Specific Conductance, µmhos/cm	Quarterly	Grab
Escherichia Coli (Organisms/100 m*l*)	Quarterly	Grab
NO_3+NO_2 as N, mg/L	Quarterly	Grab

(1) See definitions, Part I.A of this permit

If monitoring on the downgradient edge of the mixing zone demonstrates that ground water quality standards or nondegradation water quality significance criteria in the receiving ground water are exceeded as a result of the permitted discharge the permittee shall initiate monthly sampling and analysis of MW-1 for a minimum of one year (12 consecutive months) if any of the following occurs:

1. If NO_3^- + NO_2^- - N is detected in excess of 7.5 mg/L within any sample from the compliance monitoring wells located at the boundary of the mixing zone during any regularly scheduled quarterly monitoring event.

2. If NO_3^- + NO_2^- - N is detected in excess of 7.5 mg/L in both the regular quarterly monitoring sample and the required re-sample during 2 consecutive quarterly monitoring periods, or within 50% of the monitoring results within any consecutive 12-month period.

VII. Nonsignificance Determination

The Department has determined that this discharge constitutes a new source for the purpose of the Montana Nondegradation Policy (75-5-303, MCA; M 17.30.702 (18)). Because this discharge is a new source, effluent limits are based on the nondegradation criteria (ARM 75-5-715). This means that nitrate concentrations for a Level II treatment system cannot exceed 7.5 mg/L at the end of a mixing zone [ARM 17.30.715 (1) (d) (iii)]. The effluent limit for total nitrogen is based on compliance with the nondegradation significance criteria at the end of the mixing zone. The Department has determined that the proposed discharge is nonsignificant.

VIII. Special Conditions/Compliance Schedules

a) Effluent Flow Measurement

Prior to issuance of the final permit, the permittee shall submit to the Department the method of effluent flow monitoring. Effluent flow shall be monitored following treatment in the recirculating filter and prior to discharge into the drainfield. The measurement method shall be either by recorder or a totalizing flow meter from which a reading shall be obtained to report a 30 day average flow; dose counts or pump run-times will not be accepted. The permittee shall monitor the flow of the effluent continuously.

b) Monitoring Well Installation

Prior to issuance of the final permit, the permittee shall submit to the Department for approval a plan for compliance ground water monitoring well installation and a brief summary of a monitoring sampling and analysis plan for the installed well. The plan is to include the location, conceptual design and construction methods of the planned ground water monitoring well, and the monitoring, sampling and analysis methods that will be used to meet the monitoring required by the permit.

Prior to issuance of the final permit, the permittee shall submit to the Department a brief report or letter documenting the results of the monitoring well installation, final location of the installed monitoring wells and construction details for the well.

IX. Information Source

In the development of the effluent limitations, monitoring requirements and special conditions for the draft permit, the following information sources were used to establish the basis of the draft permit and are hereby referenced:

ARM Title 17, Chapter 30, Sub-chapter 5 - Mixing Zones in Surface and Ground Water, September 1999.

ARM Title 17, Chapter 30, Sub-chapter 7 - Nondegradation of Water Quality, March 2000.

ARM Title 17, Chapter 30, Sub-chapter 10 - Montana Ground Water Pollution Control System (MGWPCS), March 2002

Environmental Protection Agency, U.S. EPA NPDES Permit Writers Manual, December 1996

Environmental Protection Agency, Design Manual: Onsite Wastewater Treatment System Manual. EPA 625/R-00/008, 2002.

Fetter, C.W., Applied Hydrogeology., 1988

Stahly Engineering & Associates., MGWPCS permit application, March 2006.

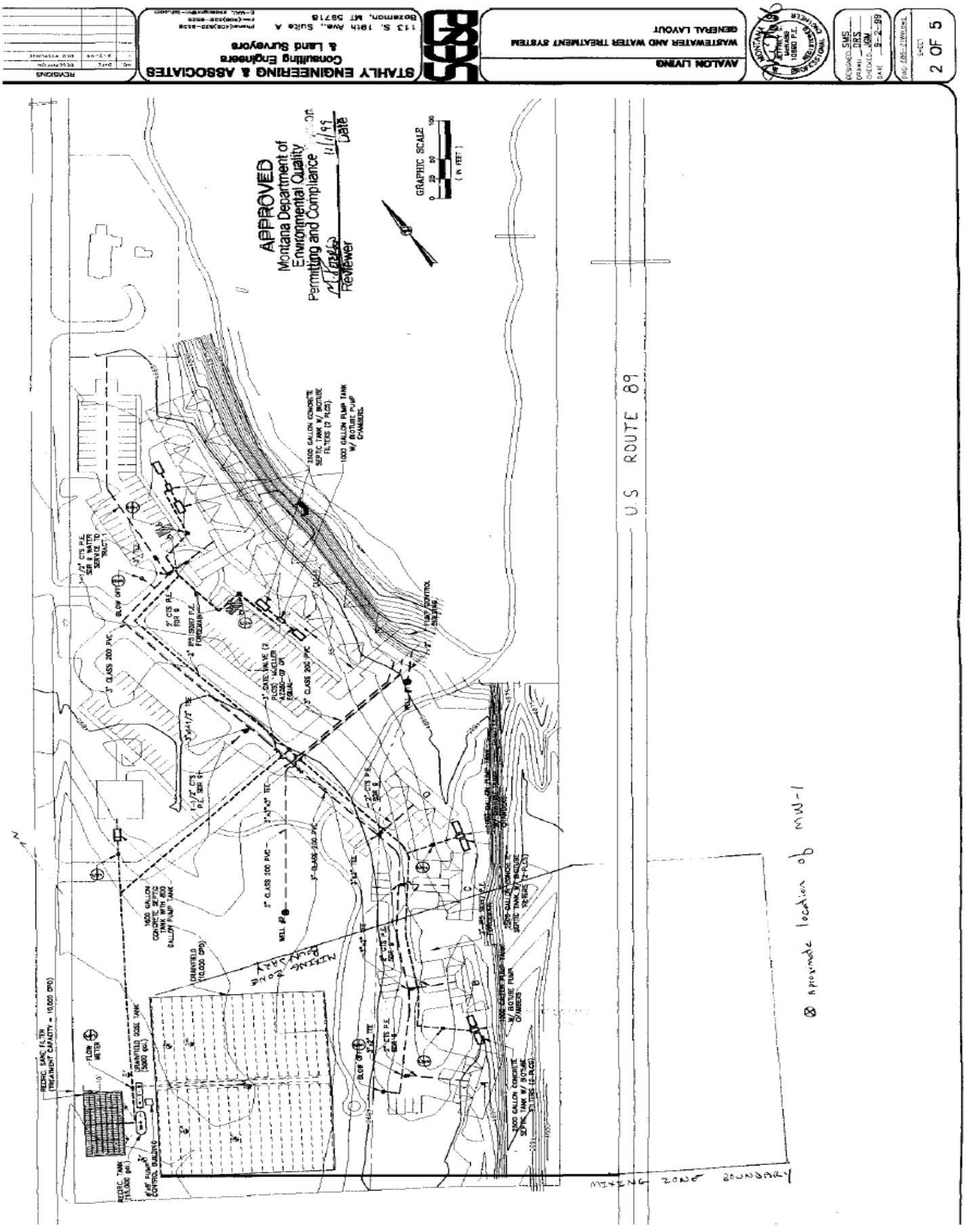
Regensburger, E. Nutrient-Reducing Wastewater Treatment System Designation Form. Montana Department of Environmental Quality. 2004

Woessner, W., Thomas, Troy., Ball, Pat and DeBorde, Dan C., (April 1998), Virus Transport in the Capture Zone of a Well Penetrating a High Hydraulic Conductivity Aquifer Containing a Preferential Flow Zone: Challenges to Natural Disinfection. , University of Montana., Missoula, Montana

United States Department of Agriculture, Natural Resource Conversation Service, http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Prepared By: Louis Volpe July 24, 2006

Attachment I


STAHLY ENGINEERING & ASSOCIATES
Consulting Engineers
& Land Surveyors
AVALON LIVING
WASTEWATER AND WATER TREATMENT SYSTEM
GENERAL LAYOUT
APPROVED
Montana Department of
Environmental Quality
Permitting and Compliance
Reviewer
Date
GRAPHIC SCALE
(IN FEET)
U.S. ROUTE 89
MIXING ZONE BOUNDARY
Approximate location of MW-1
2 OF 5